

# R & D facts

## Materials Science

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U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY



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### PARTNERS

General Motors

Corus Ijmuden

American Foundry Society

Idaho National Engineering and  
Environmental Laboratory

Idaho State University

Utah State University

Tennessee Technological University

Oxide Recycling Limited

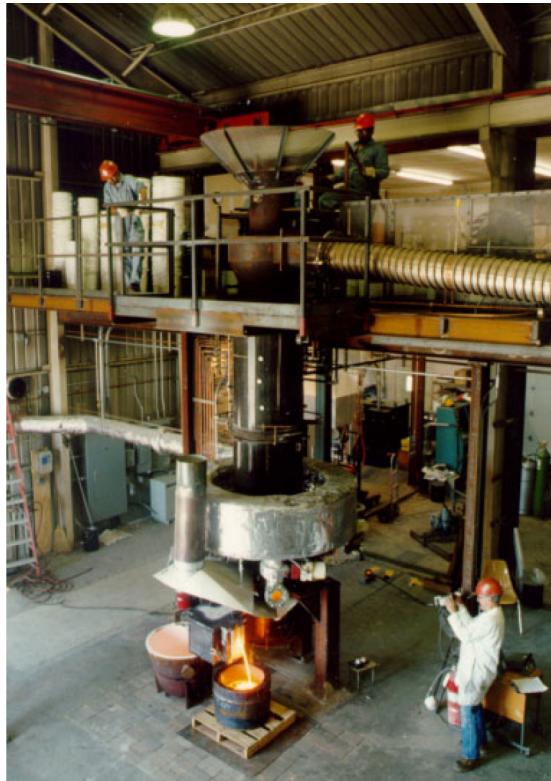
Environmental Protection Agency

National Technology Transfer Center

## CUPOLA FURNACE MELTING

Research on Cupola Furnace Melting at the National Energy Technology Laboratory (NETL) includes process optimization as well as product evaluation. With such cooperators as the EPA, General Motors, Tennessee Technological University, and Corus Ijmuden, research using this unique furnace has spanned from advanced intelligent control of cupola operation to the recycling of high iron bearing waste oxides from blast furnace steel making. The NETL cupola furnace is an ideal pilot plant test bed for cupola operations optimization for efficiency as well as oxide waste recycling and reduction.

The NETL cupola is a nominal 1 MW furnace capable of melting in excess of one ton per hour of cast iron to specified chemistries. The system includes a modern hot blast unit to preheat the combustion air to 1000 °F (540 °C), an integrated oxygen injection circuit for up to 10 percent enrichment and an aggressive air pollution control system for exhaust gas and particulate capture and treatment. The research cupola is fully instrumented for complete data acquisition and real time process control.



## **ADDRESS**

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## **CUSTOMER SERVICE**

**1-800-553-7681**

## **WEBSITE**

**[www.netl.doe.gov](http://www.netl.doe.gov)**

Specific programs that have been successfully completed in the NETL cupola furnace include providing a platform for verifying a first principles thermo-chemical model of cupola melting, advanced intelligent control systems for cupola operation, recycling waste oxides from steel making processes, recycling of oxide metals from electric arc furnace dust and silicon additives from spent green sand sources. Because all process variables, including furnace temperatures and pressures, blast rate and temperature, oxygen rate, melt rate, product chemistry and temperature, exhaust gas composition and temperature, and cooling water rate and temperature are monitored in real time, decisions on furnace operation and product chemistry can be made and adjustments instigated on the fly.

